Authors have adopted at least four methods of arranging their species: (1) the technical, as I will call it; (2) the biological; (3) the stratigraphical, as Dr. Bather points out; (4) the alphabetical.

By the technical I mean that the author describes the genotype first, and then places his other species in sequence according to their degree of difference from it. This is the only plan to which a first species rule applies justly; but this plan, though it may be common in neontology, is certainly rare in paleontology, where any of the other three methods are more usual.

The biological system consists in arranging species according to their supposed genetic sequence; but the middle or last species may be the genotype as often as the first. The biological plan may be stratigraphical in result; but not in intention. This biological method was used by Hyatt. For instance in his genus *Tropidoceras,* to name one case among many, he placed three species (*Bull. Mus. Comp. Zool.,* 5, 1867, p. 93). It can be seen from the method of his later works that he regarded these species as forming an anagenetic series, of which the first two were the immature, larval forms while the last was the mature, fully developed type of the genus; it conforms the best with his diagnosis. This, therefore, is the one to take as his genotype; a first species rule would do him injustice.

In my genera (Mon. I. O. Amm., Suppl.) the species are arranged on Hyatt's plan—in supposed genetic sequence. My genotypes are stated; but had they not been, the first species rule would fail to interpret me correctly; my genotypes come frequently in the middle of the series—preceded by species biologically less, succeeded by species biologically more, developed.

The stratigraphical method was one much favored by the older paleontologists. In such a work as d'Orbigny's "Prod. Pal." the whole arrangement is stratigraphical; that governs the first mention. Opening at random, I find *Cryptoceras* d'Orbigny first species mentioned *C. subtuberculatus* of the Devonian; but it is obvious that he regarded as the genotype *C. dorsalis* of the Carboniferous.

In other works species may be arranged by zones or beds, beginning with the earliest; the first species need not be the author's type.

Of the alphabetical method an instance may be seen in M'Coys "Carb. Foss. Ireland." His first species of *Brachythyris* is *B. duplicicosta.* Dall in his most useful work, "Index Names Brach.," records this species; and the inference is that he regards it as the type. But M'Coy had depicted without final name a form of *Brachythyrus* a few pages earlier; this is obviously his type and it is *B. oralis* which comes sixth. In *Martinia* the first species is *M. decora,* as Dall records; but M'Coy had figured an example in the same way, which is clearly a form he united under *M. glabra;* that comes third. Then M'Coy had given a further indication that he regarded *M. glaber* as his type—by using *Martinia,* for *glaber* is Martin's species.

Then there are cases in which the author indicates his type by making the generic name resemble a trivial one. Thus the obvious type of *Reticularia* M'Coy is *R. reticulata;* of *Fusella* M'Coy, *S. fusiformis;* of *Ornithella,* Deslongchamps, *T. ornithocephala.*

Since in these various cases where the genotype has been stated or obviously indicated the first species rule is demonstrably unjust, it follows that in other cases it is quite as likely to be wrong. A rule which presumes to interpret correctly in unknown cases must surely be able to show that it does justice in known cases. Tested by these the first species rule breaks down.

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THAME, ENGLAND,
August 2, 1907

HOLOTHURIAN NAMES

DR. THEO. GILL, in the August 7 issue of this journal (p. 185) rightly takes exception to the use of *Holothuria* for a genus of echinoderms. In my paper on "The Holothurians of the Hawaiian Islands" I used the name in the sense that Théel, Lampert, Ludwig and every other writer in recent years has employed the term, and I did not, as Dr. Gill

surmised, take the trouble to look up the original reference (Linnæus, "Syst. Nat.," 10th ed., I., p. 657). Having *had* confidence in the above authorities I copied their blunder, with the best intentions. So much for my error.

I shall adopt (but not "with pleasure") Jäger's name *Bohadschia*. I have for some time been aware that *Microthele* probably has precedence over *Actinopyga* Bronn (for the genus erroneously called *Mülleria*), but I hesitate to accept it until the identity of Brandt's species is settled beyond peradventure.

Apropos the passing of *Holothuria*, for the old and well-known genus of sea-cucumbers, an amusing yet serious situation presents itself. Naturally, if, as Dr. Gill points out, *Holothuria* is really a Portugese man-of-war, we can no longer speak of sea-cucumbers as "holothurians," nor of the class as *Holothurioidea*. The word "holothurian" has been, in its limited field, as useful as the more familiar "mammal." And which of the several synonyms should succeed *Holothurioidea*?

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SPECIAL ARTICLES

The Occurrence of Middle Tertiary Mammal-bearing Beds in Northwestern Nevada

In the summer of 1905 the writer received from Mr. Robert L. Fulton, of Alameda, California, several fragmentary bones and teeth of Miocene mammals, said to have been obtained at Virgin Valley, in northwestern Nevada. Subsequently arrangements were made to visit the locality in company with Professor John A. Reid, of the University of Nevada. Professor Reid very kindly made inquiry as to the location of the beds, but was himself unable to visit the region. In June, 1906, the writer in company with Mr. Felix T. Smith, of the University of California, visited Virgin Valley for the purpose of making a preliminary examination of the field. In reaching the valley we were kindly assisted by the employees of the Miller & Lux Company, and in locating the most fossiliferous exposures we were much indebted to Mr. T. H. McGhee, whose son, Mr. Edward McGhee, was the first person known to have discovered fossil bones in that region.

Virgin Valley is situated in northwestern Nevada, about 15 miles south of the Oregon line and 40 miles from the California line. Virgin Creek, which drains the valley, is a tributary of Thousand Creek, emptying into Thousand Lake, close to the northern border of Nevada. The region about Virgin Valley is semi-arid and is practically treeless. Though no extensive search has been made through the literature, I am not aware that this region has ever been visited by any geological party. A number of explorers have evidently passed near it to the north and to the south.

The valley of Virgin Creek is a basin with a north and south trend, the fossil beds being situated in a trough formed by an older series. The older formation consists largely of tuffs, ashes, and rhyolitic lavas. Superficially it resembles a part of the Clarno Eocene series of the John Day region to the north. On the east side of the syncline, at Thousand Creek Hill, a fine section of these beds is exposed. Some of the tuffs in the upper part of the series are exceedingly coarse, and pieces of pumice in them are in many instances several inches in diameter. The lower portion of this series was not examined, but the materials seem to be finer toward the base of the section. Beds superficially similar to those on Thousand Creek Hill cut off the southern end of Virgin Valley on the other side of the syncline, beyond the Virgin Ranch. At this point they dip back toward the Thousand Creek Hill to the northeast.

The mammal-bearing Tertiary formation, which is here tentatively designated as the Virgin Valley beds, rests in the basin formed by the older tuffs. Where the lower portion of this formation rests upon the older beds it has been somewhat disturbed, but the amount of disturbance appears, at least in some cases, to be less than that shown by the older series. The inclination of the Virgin Valley beds on the eastern side of the syncline may be largely due to the development of an extensive fault